



dYdX V3 Risk Parameter Recommendation Platform Methodology

Exploration of Methodologies used for generating real-time margin parameter recommendations in alignment with live market liquidity conditions.



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dYdX V3 Risk Parameter Recommendations Platform:
Methodology Exploration

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Abstract

As risk-focused contributors within dYdX and the broader DeFi ecosystem, [Considered.finance](#) and Chaos Labs continuously explore mechanism design, economic security frameworks, and market risk requisites for creating decentralized protocols. We're excited to present our latest collaboration - the [dYdX Risk Parameter Recommendation Portal](#), generating real-time margin parameter recommendations in alignment with live market liquidity conditions. We aim to offer transparent, data-driven methodologies and tools to optimize risk management within dYdX.

The forthcoming V4 launch holds the potential to act as a landmark in the protocol's decentralization trajectory, signifying our progression toward a permissionless, transparent, on-chain derivatives exchange. Notwithstanding the potential benefits of such an open and transparent perpetual exchange, it does present numerous challenges that necessitate a collective, community-led risk framework. Stated succinctly, the goal of V4 is to achieve complete decentralization, which implies that the platform will need to operate autonomously, with the onus of risk management being transferred to the community.

As a first step to creating the tooling necessary for decentralized risk management, Chaos Labs, in collaboration with [Considered.finance](#), has created a dashboard implementing [Considered.finance](#) research paper titled "[Proactive Risk Management of dYdX Risk Parameters](#)."

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Chapter 1

Introduction

1 Platform Overview

Well-calibrated margin risk parameters serve a dual function. Optimized risk parameters shield the dYdX protocol from insolvency brought about by market volatility or malicious actors while minimally constraining standard trading activity. The dYdX Parameter Recommendation Portal offers a transparent way to suggest optimal parameter levels and all inputs informing them. The individual market orderbook metrics, in particular, offer the community a benchmark for liquidity on the exchange that can be utilized broadly in DAO decision-making processes. Recent discussions concerning the appropriate sizing of rewards underscore how this data point could be advantageous. Utilizing recently observed order book depth as the input ensures a consistent and unbiased method for calibrating margin risk parameters. Ecosystem players can feel confident that the appropriate rails are set to keep their funds and the protocol safe.

Leveraging the framework delineated in Proactive Risk Management of dYdX Risk Parameters, the portal proposes risk parameter modifications incorporating real-time market liquidity's fluid dynamics. The dYdX exchange utilizes a limited order book structure to stimulate liquidity and establish prices, which adds a layer of complexity given its reliance on market-maker behavior. Acknowledging the distinctive liquidity dynamics influenced by various factors in each market, the platform provides an objective, transparent, and systematic method for setting margin parameters that align with the exchange's liquidity dynamics.

This system is configured to evaluate trading conditions in dYdX v3 when informing parameter recommendations. The underlying data and algorithms are adaptable and robust and can be easily modified in v4 in most risk parameter frameworks.

Starting now with v3 will help inform configurations from the outset.

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Parameter Recommendations

Chaos Labs and Considered Finance Methodology

Chaos Labs and Considered Finance have partnered on optimizing the dydx risk parameters. Recommendation model uses historic and current order book data to calculate the optimal margin requirement at different position sizes.

Discover Methodology

Markets

Filter Export to CSV Search

Market	Baseline Position Size	Incremental Position Size	Maximum Position Size
1INCH / USD	350K → 18.31K	70K → 2.29K	3.5M → 109.88K
AAVE / USD	7K → 4.88K	1.4K → 520.44	70K → 28.1K
ADA / USD	1M → 24.91K	200K → 2.77K	10M → 149.43K
ALGO / USD	750K → 4.13M	150K → 459.06K	7.5M → 24.79M
ATOM / USD	70K → 29.4K	14K → 3.27K	700K → 176.38K
AVAX / USD	30K → 52.9K	6K → 5.88K	300K → 317.38K

Figure 1.1: On the homepage of the dYdX Parameter Recommendations Portal, users can access high-level recommendations tailored to specific markets. For a comprehensive understanding of the methodology behind these recommendations, users can click on the "Discover Methodology" button, which will redirect them to the Considered Finance research paper titled "Proactive Management of dYdX Risk Parameters," providing a thorough exploration of the methodology.

Chapter 2

Real-Time Risk Parameters for dYdX V3

1 Market-Specific Parameter Recommendations

The platform leverages real-time dYdX order book data at its core, recording historical data and creating an extensive observation history. Historical data is the foundation for computing recommended baseline and maximum position sizes, with the incremental position size derived accordingly.

This process provides a sound basis to protect all stakeholders through consistent application across markets. In essence, traders will only be limited from opening positions that run an intolerable risk of not being able to be liquidated in stressed market conditions.

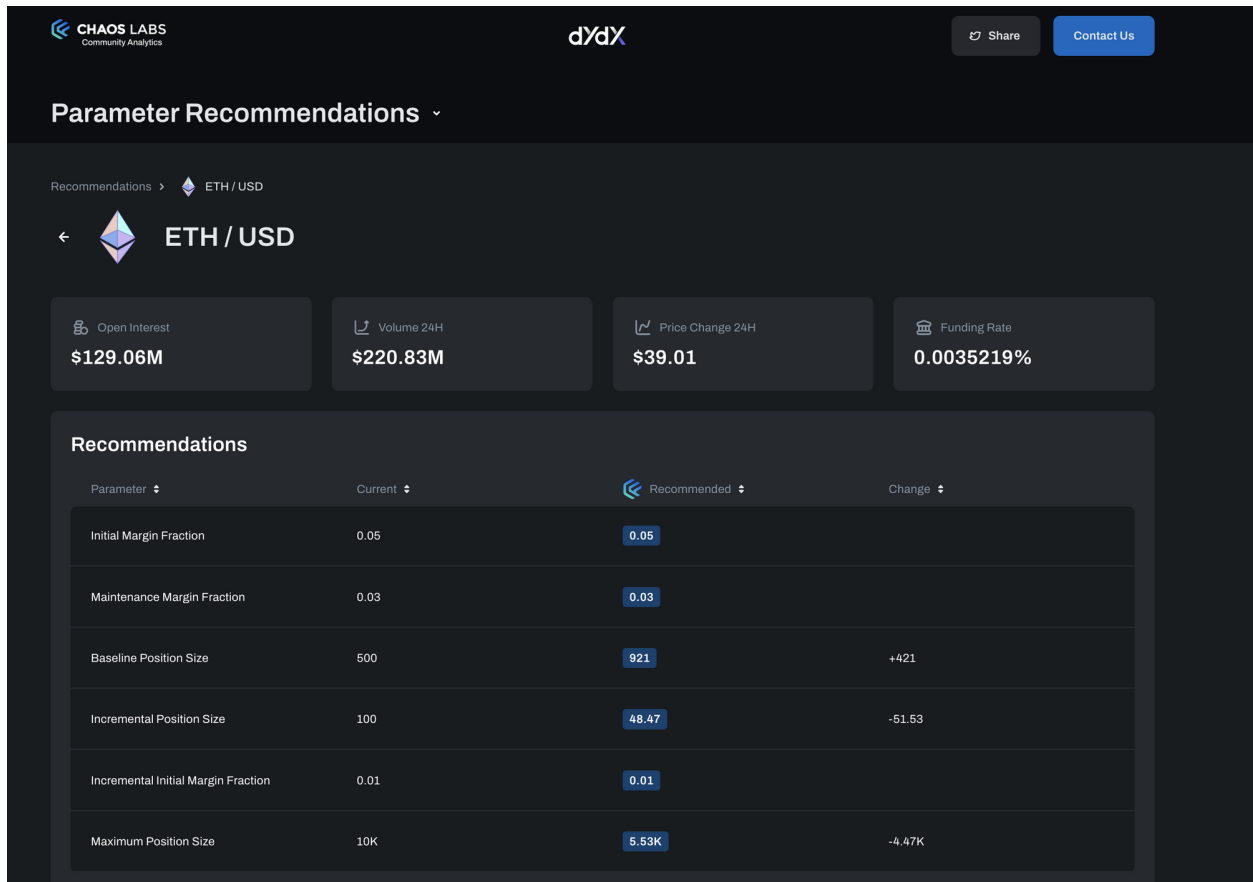


Figure 2.1: Community members can peruse data specific to each market by selecting the desired market row. This user-friendly feature ensures accessibility and transparency of information, contributing to informed decision-making within the ecosystem.

Clicking into a market opens the Market Detail view, which displays parameter recommendations specific to a market. The Chaos Labs data infrastructure ingests real-time dYdX order book data and stores long-term observations. A rolling period of this history is then used to compute recommended *baselinePositionSize*, and *maximumPositionSize* values from which the *incrementalPositionSize* is inferred, based on research and algorithm by Considered Finance.

1.1 Maximum Allowable Leverage as a Function of Position Size

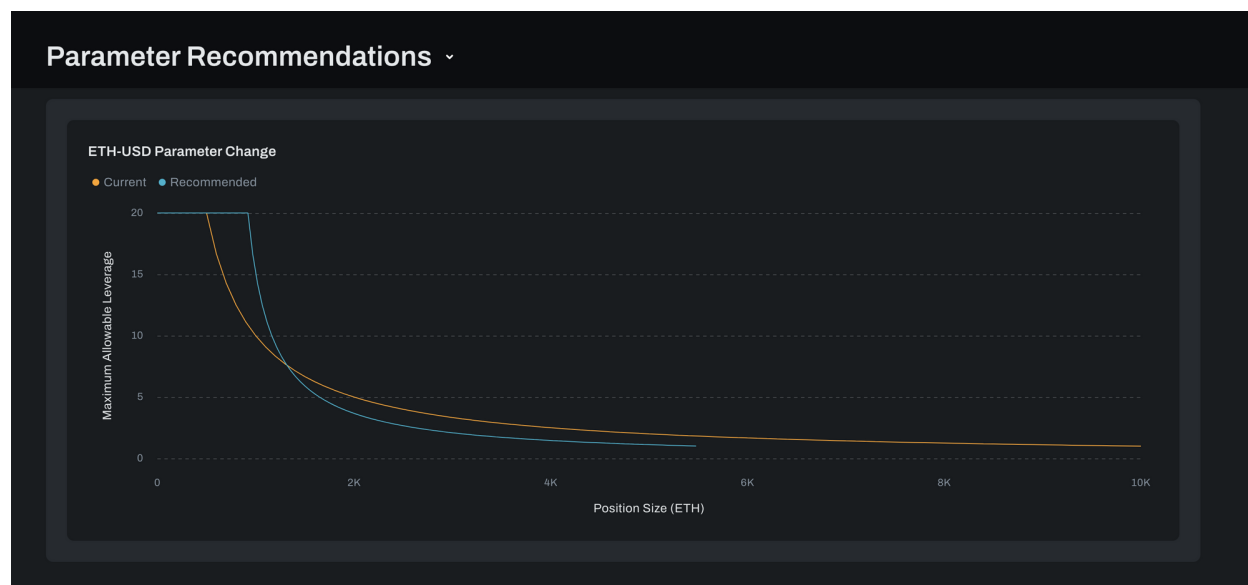


Figure 2.2

The Parameter Change data visualization graphically juxtaposes Maximum Allowable Leverage and position sizes. The blue line delineates recommendations driven by market liquidity, while the orange line mirrors the present market configuration. Notably, the market-specific Portal Recommendation, depicted in blue, exhibits a steeper downward slope as a function of position size, indicating a more restricted availability of market liquidity. This allows traders room to trade higher leverage up to around 1800 ETH in this case while protecting the exchange from overstressing the orderbook above that.

1.2 Order Book Liquidity Visualization

Current and historical order book data propose the most efficient configurations for each market.

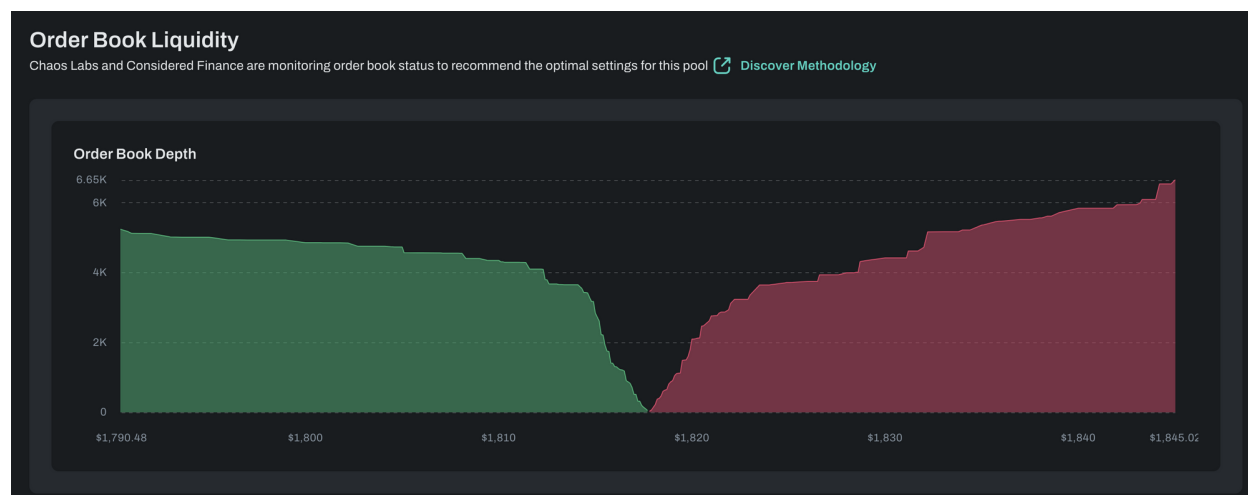
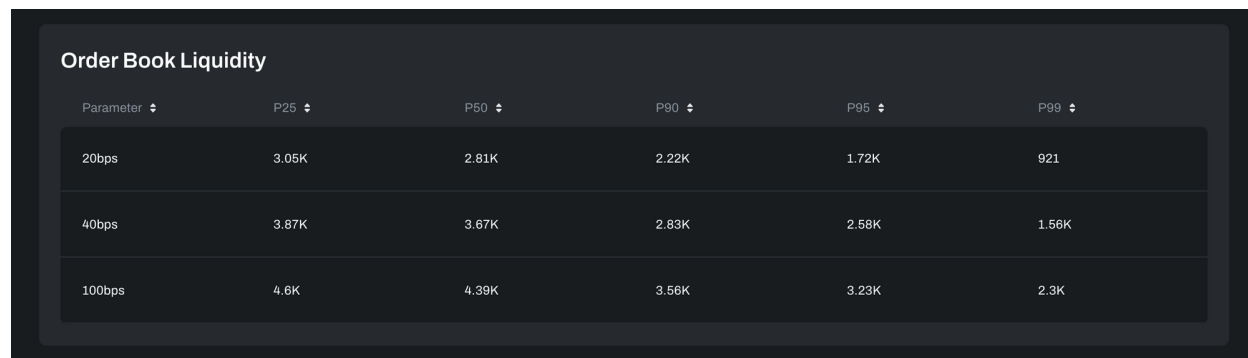


Figure 2.3: Displaying a real-time, market-specific order book snapshot, comprehensively depicting the current state of buy and sell orders.

1.3 Order Book Liquidity Analysis

The ensuing chart visually illustrates the median depth quantile as it correlates with the basis point distance from the mid-price per market. This representation provides insight into the market makers' perspective on price fluctuation as we diverge from the prevailing market price.

This also provides an objective measure of orderbook liquidity for the community to use as a benchmark. The different percentiles add a consistency dimension in addition to the median depth.



Parameter	P25	P50	P90	P95	P99
20bps	3.05K	2.81K	2.22K	1.72K	921
40bps	3.87K	3.67K	2.83K	2.58K	1.56K
100bps	4.6K	4.38K	3.56K	3.23K	2.3K

Figure 2.4

1.4 Calculating Median Depth Quantile as a Basis Point Distance Function - Algorithmic Framework

For transparency, we present the utilized algorithm for calculating median depth quantiles:

1. Initiate order book liquidity sampling across each live market at the following intervals: 20bps, 40bps, and 100bps. Sampling should occur at regular timeframes (preferably every 15 or 30 minutes for optimal insight into traditional finance data releases, although granularity can be adjusted based on practical constraints). Liquidity within a specific spread is defined as:

$$\min(\sum \text{bidLevel} \geq \text{markPrice} \times (1 - \text{spread}) * \text{bidSize}, \sum \text{askLevel} \leq \text{markPrice} \times (1 + \text{spread}) * \text{askSize})$$

2. Designate a sample length for computation (initially set at three months, considering these parameters should be relatively stable, and given the reliance on the distribution tail, recommendations to decrease will promptly surface).
3. Compute and project distribution statistics onto the dashboard, thereby objectively representing the market-observed liquidity on the market detail page utilizing the established sample length.
4. Determine the risk parameters based on each level's 99th percentile of least observed liquidity. The `baselinePositionSize` should be the 99th percentile at 20bps in the ETH and BTC markets and the 99th percentile at 40bps in the remaining markets, excluding UMA and SNX. UMA and SNX should be at $\frac{1}{6}$ of the 99th percentile at 100bps.
5. Define the `maximumPositionSize` as six times the `baselinePositionSize` across all markets.

Chapter 3

Conclusion

1 Final Thoughts and Forward Path

In conclusion, this portal represents the beginning of our risk research endeavors, contributions to support the forthcoming V4 launch, and the consequent ushering in a genuinely decentralized dYdX. The development of the dYdX Parameter Recommendations Portal and our ongoing examination into mechanism design, economic security frameworks, and market risk reflect our commitment to creating a decentralized, economically secure, and optimally functional environment.

Our research initiatives aim to highlight transparency, encourage data-informed decision-making, and seek to formalize the understanding and measurement of liquidity in the dYdX ecosystem.

As we look towards the horizon of the V4 launch, we are excited by the opportunities for collaboration and knowledge exchange within the community. Our joint effort with Considered.finance will be one of many as we strive towards fostering a robust and resilient dYdX ecosystem.

We actively encourage and value the community's feedback or ideas. If there are any thoughts, suggestions, or insights regarding other potential areas of risk research, optimization, or mechanism design that could have a substantial impact, we are happy to dive deeper. We firmly believe in the power of collaboration and are excited for what comes next for dYdX as we march towards V4.

Appendix A

About Chaos Labs

[Chaos Labs](#) is a cloud-based platform that develops risk management and economic security tools for decentralized finance (DeFi) protocols. The platform leverages sophisticated and scalable simulations to stress test protocols in adverse and turbulent market conditions. By partnering with DeFi protocols, Chaos Labs aims to create innovative solutions that enhance the efficiency of DeFi marketplaces.

The Chaos Labs team exhibits exceptional talent and represents diverse expertise, encompassing esteemed researchers, engineers, and security professionals. Chaos Labs has garnered its experience and skills from renowned organizations, including Google, Meta, Goldman Sachs, Instagram, Apple, Amazon, and Microsoft. Additionally, the team boasts members who have served in esteemed cyber-intelligence and security military units, further contributing to their unparalleled capabilities.

You can explore our past and ongoing projects for customers like Aave, GMX, Benqi, dYdX, Uniswap, Maker, and more in the [Research](#) and [Blog](#) sections of our website.